

a. m., the veering of winds to northeast in Western Texas indicated the centre shown in the chart. This day the depression moved in a northeast track to western Tennessee and the winds in Texas shifted to high and cold northerly. 14th, the storm-centre moved into the Lake Ontario country. 15th, it disappeared beyond the Gulf of St. Lawrence with ill-defined track. The movement of depression No. IV was quite rapid and the precipitation had been confined in an unusual degree to the centre of the low area. The barometer continued to fall to the east of its charted track, and the rain belt also moved to the east and there was developed a secondary depression, No. V, whose centre is first charted on the morning of the 15th, near Augusta, Ga., though at that time, a region of low barometer extended from New England to Florida. This depression rapidly pursued a northeasterly track, leaving the coast near Cape Henry, moved nearly parallel to the Gulf stream, and is located on the morning of the 16th near Halifax, N. S. The precipitation was general, but not abundant. The high winds reported were of short duration and confined to the Middle Atlantic and North Carolina coast. These storms, taken together are interesting, since the development of the second depression may have been mainly due to the rapidity of the march of the centre of the first low area.

No. (VI and VII).—These two low areas are described together, although they developed in portions of the country far distant, but, as will be seen from their charted tracks the depressions approaching each other were united on the morning of the 21st in the Ohio valley. 17th, there was a general fall in pressure in the Rocky Mountain region, the barometer being most below the normal at Salt Lake. 18th, the low area occupied nearly same position with a slight fall of pressure in Texas. 19th, a decided fall in Texas, where the precipitation and circulation of the winds, showed the formation of a storm-centre. There was a more decided fall of barometer in the Northwest, but a great deficiency in precipitation. 20th, this day the centres of depression marched slowly to the eastward, No. VI moving along the West Gulf coast, and No. VII remaining in Minnesota while there was a marked decline in pressure from the Upper Lakes to the East Gulf. The precipitation in the Gulf States was very abundant, but in the Upper Lakes and the Northwest, although general it was light. 21st, 7:35 a. m., after midnight there was a fall in pressure in the Ohio valley averaging 0.4 inch, and the two low areas became united in a single depression central near Cincinnati, Ohio. 4:35 p. m., the storm centre was over Lake Erie, but southerly gales prevailed on the North Carolina coast, and high southeasterly gales on the Middle Atlantic coast. 11 p. m., New York State was the region of lowest barometer, easterly gales had extended along the New England coast, but on the Middle Atlantic and Carolina coast the wind had shifted to high westerly. 22d, the storm-centre moved along the St. Lawrence valley, and into the Gulf beyond. Cautionary Signals were ordered for this storm, 18th, at Indianola and Galveston, 20th, from Savannah to Kittyhawk, N. C., 21st, from Cape Henry to Eastport; these were changed to Cautionary Off-Shore Signals, 21st from Smithville to Kittyhawk, N. C., and from Baltimore to Wood's Holl, 22d, from Boston to Eastport. The following maximum velocities (measured) are reported: Indianola, 40 N.; Galveston, 30 NW.; Smithville, 36 W.; Wilmington, 43 SW.; Cape Lookout, 44 S.; Cape Hatteras, 48 SW.; Kittyhawk, 40 S.; Cape May, 38 SE., 48 W.; Atlantic City, 36 SE.; Barnegat, 40 SE.; Sandy Hook, 47 SE., 48 W.; New York, 28 SE.; New London, 35 SE.; Wood's Holl, 48 SE., 58 W.; Thatcher's Island, 36 SE., 36 W.; Boston, 40 E., 35 W.; Portland, 44 E., 32 W.; Eastport, 40 SE.

No. VIII.—24th, the barometer was high and rising in the Southwest, and a severe "norther" with cold rain or sleet prevailed on the West Gulf coast. 25th, the pressure slowly diminished in the Gulf States, and the circulation of the winds in the Gulf marked the development of a storm centre. 26th, 7:35 a. m., the centre of depression was situated southwest of New Orleans. This day the storm-centre moved, with great rapidity, to the northeast as charted. 27th, 7:35 a. m., it passed beyond the limits of the map. It was accompanied by general but light precipitation in the Gulf and South Atlantic States. The winds were high and from the north on the Texas coast elsewhere were only brisk.

## INTERNATIONAL METEOROLOGY.

On chart No. IV are shown the probable tracks of storm-centres over the oceans, as follows: *Atlantic*.—No. I, as previously given; No. II is the extended track of area No. IV, given under International Meteorology in the November REVIEW. No. III is the extended track of area No. IV of the October REVIEW; No. IV is the extended track of area No. VI, given under International Meteorology in the November REVIEW, and which probably joined the following area; No. V is the extended track of area No. IX, October REVIEW; No. VI is the extended track of No. VII, given under International Meteorology in the November REVIEW; No. VII is the extended track of area No. III of the November REVIEW. *Caribbean Sea*.—November 24th and 28th, a violent hurricane reported south of St. Thomas, W. I.; at midnight of December 1st, the schooner Thos. Pickering was reported driven ashore by hurricane on reef 35 miles NNE. of Saona Island, near St. Domingo. December 1st and 2nd heavy E. and SE. squalls at Navassa. At Colon, Panama, a severe "norther" commenced on morning of the 4th and continued until the 10th, accompanied by heavy rains and floods; at 7 p. m. of the 10th, a second "norther" commenced, lasting until the 14th; much damage resulted from these storms. *Pacific*.—No. I, W. to NW. "typhoon;" No. II, November 15th to 19th; No. III, November 22nd and 23rd, hurricane, barometer 28.18; No. IV, November 28th and 29th; No. V, December 3rd to 6th. *Indian Ocean*.—Mauritius, "during a barometric depression which passed over this island, between September 28th and October 8th, severe gales occurred in 36° to 44° S. and 20° to 42° E.; the wind at Mauritius veered from SE. to E., NE., &c., round the compass."

Reports from St. Michael's, Alaska, received at this office for the year ending June 30th, 1878, contain the following items: *July*.—16th, SW. gale all day, ending abruptly about noon of the 17th; 29th and 30th, high winds from SW. and W. *August*.—28th, N. gale commenced, reaching 60 miles per hour on the 29th; high winds occurred on the 2d, 12th, 13th, 15th, 17th, 22d and 28th; faint aurora on the 10th. *September*.—23rd, a northerly gale commenced, lasting until 26th, and reaching 52 miles per hour on the 25th; high winds on the 1st, 2nd, 14th and 22nd; snow on the 11th, first of season, observed on hills about 10 miles distant, a few flakes falling at station 12th, 13th, 18th and 19th; 14th, thin ice on pools; frost on 13 days. *October*.—Gales on the 12th and 13th, NE., 16th, E'y, 19th and 20th, S'y, 21st, N., 24th, N., and 26th, E.; snow on 12 days, 6 inches on ground at end of month; ice on pools, 7th; skating, 14th; forming on bay, 15th; 22nd, large part of bay covered, temperature of water 30°; 28th, several inches thick near shore, natives crossing inner part of bay; 31st, ice breaking up and snow disappearing; aurora observed on the 11th, 12th and 13th; on the 7th most of the fresh-water fowl had left, and on the 15th, "the only birds remaining, except the winter residents, were a few sandpipers, gulls and cormorants." *November*.—Gales on the 1st, E'y 40, 4th and 5th, N. 60. 9th, S. 63, 11th and 12th, E. to NE. 67, barometer 28.89, 21st, N. 40, 24th, NE. 43, 27th, NE. 47; snow on 5 days, eight inches on ground at end of month; freezing every day; aurora, 7th and 26th. *December*.—Gales on 2nd, —57; 21st, S., 46; 28th and 29th, N., 41; snow on eight days, twelve inches on ground at end of month; "winter set in, bay frozen across;" auroras, 5th and 31st. *January*.—Gales on the 1st, E., 40; 11th and 12th, NE., 48; 22nd, N'y, 53; snow on five days, fifteen inches on ground at end of month; mirage 30th. *February*.—Gales on the 8th, 9th and 10th, NE., 48; snow on three days, twenty-three inches on ground at end of month; auroras, 5th, 26th and 27th; mirage observed on five days. *March*.—Gale on the 29th, 30th and 31st, NE., 40; snow on four days, fifteen inches on ground at end of month; 23rd to 25th, first thaw of season; 25th, showers on distant mountains; mirage observed on five days. *April*.—Gales on the 5th and 6th, S. to E., 43; 25th, S. to E., 54; snow on sixteen days, eighteen inches on ground at end of month; 17th and 18th, thawing rapidly; 19th, freezing; 26th, first wild goose seen. *May*.—3d, severe S. gale, with heavy snow, S., 73 miles; snow on two days; only scattered patches on ground at end of month; rain on ten days; 12th, snow rapidly disappearing; 14th, lakes opening rapidly; 16th, lakes all open and many birds arriving; 18th, much water on ice in bay; 30th and 31st, high tides in morning; ice cracking; 31st, vegetation springing up rapidly and nearly all migratory birds returned; 19th first swallow; freezing nearly every night; 13th, severe frost; 9th, mirage all day, elevating into view capes 60 or 70 miles away, and showing open water 15 to 20 miles southward, also on 10th, 11th and 30th. *June*.—No gales; twelve rainy days; 7th and 8th, ice moving out of bay; 10th, all out of inner bay; first trader from Yukon; 11th, natives arrived in boat from northern end of Sound; 15th, ice all gone; 25th, much large floating ice from seaward; 30th, but little ice; one or two snow-drifts still on mountains; month very cold, and vegetation backward.

### Summary.

DATE.	BAROMETER.			TEMPERATURE.				Relative Humidity.	Prevailing wind.	Total Monthly movement, in miles.	Rain-fall and melted snow.	DAYS			Depth of snow, §
	Mean.	Max.	Min.	Mean.	Max.	Min.	Range†					On which rain fell.	On which snow fell.	Cloudy.	
1877—July *.....	29.85	30.18	29.52	56°.4	75°	41°	23°	83	SW	1,812‡	0.67	8	0	12	0
August.....	29.74	30.09	29.36	53°.4	67°	42°	16°	90	S	7,381	2.48	19	0	24	0
September.....	29.80	30.46	29.19	40°.8	61°	21°	23°	87	N	8,339	2.23	11	5	20	0
October.....	29.77	30.26	29.14	28°.6	45°	4°	17°	90	S	10,134	0.27	1	12	23	8
November.....	29.47	30.25	28.89	15°.7	41°	—18°	21°	65	S	9,428	0.52	1	5	14	8
December.....	29.46	30.17	28.95	1°.9	32°	—30°	32°	98	S	10,377	0.11	0	5	10	12
1878—January.....	29.45	30.04	28.87	1°.4	30°	—47°	36°	90.6	NE	7,266	0.11	0	5	11	15
February.....	29.46	29.99	28.87	—6°.2	28°	—62°	42°	98	NE	6,784	0.12	0	2	8	23
March.....	29.61	30.01	29.05	3°.6	41°	—30°	42°	93	NE	6,585	0.12	0	4	7	15
April.....	29.61	30.21	28.95	21°.6	42°	—17°	36°	90	E	8,218	0.44	0	16	25	18
May.....	29.84	30.34	28.98	34°.1	65°	6°	3°	89	NE	6,119	2.59	10	2	20	—
June.....	29.74	30.11	29.26	46°.3	64°	32°	2°	86	N	6,642	1.40	12	0	17	0

\* From 15th to 31st only. † Greatest daily range. ‡ From 25th to 31st only. § Depth of snow on ground at end of month, in inches.

*York Factory, Hudson Bay Territory*.—The observer, (Mr. J. Fortescue,) in submitting reports for June, July and August, states: "all our ships speak of heavy ice in Hudson's Bay, as high as the fore-yards," and thinks that "an ice stream has been liberated from Sir Thos. Roes Welcome, and through the various channels intersecting what was formerly supposed to be Southampton Island, by the two previous mild winters; and that the prevalence of easterly winds all summer has kept it in the bay, where icebergs are rarely seen."

Advices from Point Barrow, dated August 19th, state that nearly all the whaling fleet had arrived there, some as early as the latter part of July, having worked northeastward as fast as the ice opened away from the land; some found much hindrance from ice, and two vessels were lost a few miles south of Point Barrow. August 8th to 11th, there was much drifting ice between Point Barrow and Return Reef; at time of writing the ice which previously had been close to the land from Point Barrow to Point Belcher, 60 miles south, was fast disappearing to the westward, with a continued ENE. wind.